



# MATHS

## NCERT - NCERT

### MATHEMATICS(GUJRATI ENGLISH)

#### REAL NUMBERS

#### Example

1. Represent  $\frac{5}{3}$  and  $-\frac{5}{3}$  on the number line.



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2. Are the following statements True? Give reasons for your answers with an example.

Every rational number is an integer.



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3. Are the following statements True? Give reasons for your answers with an example.

Every integer is a rational number



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4. Are the following statements True? Give reasons for your answers with an example.

Zero is a rational number



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5. Find two rational numbers between 3 and 4 by mean method.



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6. Express  $\frac{7}{16}$ ,  $\frac{10}{7}$  and  $\frac{2}{3}$  in decimal form.



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7. Express 3.28 in the form of  $\frac{p}{q}$  (where  $p$  and  $q$  are integers,  $q \neq 0$ ).



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8. Express  $1.\overline{62}$  in  $\frac{p}{q}$  form where  $q \neq 0$ ,  $p, q$  are integers.



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9. Locate  $\sqrt{2}$  on number line



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10. Locate  $\sqrt{3}$  on number line



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11. Find any two irrational numbers between

$\frac{1}{5}$  and  $\frac{2}{7}$ .



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**12.** Find an irrational number between 3 and 4.



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**13.** Examine, whether the following numbers are rational or irrational :

$$(3 + \sqrt{3}) + (3 - \sqrt{3})$$



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**14.** Examine, whether the following numbers are rational or irrational :

$$(3 + \sqrt{3})(3 - \sqrt{3})$$



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**15.** Examine, whether the following numbers are rational or irrational :

$$\frac{10}{10\sqrt{5}}$$



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**16.** Examine, whether the following numbers are rational or irrational :

$$(\sqrt{2} + 2)^5$$



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**17.** Visualise the representation of  $3.5\bar{8}$  on the number line through successive magnification upto 4 decimal places.



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18. Check whether (i)  $5\sqrt{2}$  (ii)  $\frac{5}{\sqrt{2}}$  (iii)  $21 + \sqrt{3}$

(iv)  $\pi + 3$  are irrational numbers or not?



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19. Subtract  $5\sqrt{3} + 7\sqrt{5}$  from  $3\sqrt{5} - 7\sqrt{3}$



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20. Multiply  $6\sqrt{3}$  with  $13\sqrt{3}$



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21. Simplify the following expressions :

$$(3 + \sqrt{3})(2 + \sqrt{2})$$



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22. Simplify the following expressions :

$$(2 + \sqrt{3})(2 - \sqrt{3})$$



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**23.** Simplify the following expressions :

$$(\sqrt{5} + \sqrt{2})^2$$



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**24.** Simplify the following expressions :

$$(\sqrt{5} - \sqrt{2})(\sqrt{5} + \sqrt{2})$$



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**25.** Find the square root of  $5 + 2\sqrt{6}$



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26. Rationalise the denominator of  $\frac{1}{4 + \sqrt{5}}$



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27. If  $x = 7 + 4\sqrt{3}$  then find the value of

$$x + \frac{1}{x}$$



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28. Simplify  $\frac{1}{7 + 4\sqrt{3}} + \frac{1}{2 + \sqrt{5}}$



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29. Simplify

$$2^{\frac{2}{3}} \cdot 2^{\frac{1}{3}}$$



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30. Simplify

$$\left(5^{\frac{1}{7}}\right)^4$$



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31. Simplify

$$\frac{3^{\frac{1}{5}}}{3^{\frac{1}{3}}}$$



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32. Simplify

$$7^{\frac{1}{17}} \cdot 11^{\frac{1}{17}}$$



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## Do This

1. Represent  $\frac{-3}{4}$  on the number line.



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2. Right 0, 7, 10,  $-4$  in  $\frac{p}{q}$  form.



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3. Guess my number : Your friend chooses an integer between 0 and 100. You have to find out that number by asking questions, but your friend can answer only in 'yes' or 'no'. What strategy would you use?



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4. Find any five rational numbers between 2 and 3 using mean method.



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5. Find any 10 rational numbers between

$$-\frac{3}{11} \text{ and } \frac{8}{11}.$$



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6. Express (i)  $\frac{1}{17}$  (ii)  $\frac{1}{19}$  in decimal form.



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7. Find rationalising factors of the denominators of  $\frac{1}{\sqrt{8}}$



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8. Simplify :

$$(16)^{\frac{1}{2}}$$



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9. Simplify :

$$(128)^{\frac{1}{7}}$$



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10. Simplify :

$$(243)^{\frac{1}{5}}$$



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11. Write the following surds in exponential form

$$\sqrt{2}$$



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12. Write the following surds in exponential form

$$\sqrt[3]{9}$$



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**13.** Write the following surds in exponential form

$$\sqrt[5]{20}$$



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**14.** Write the following surds in exponential form

$$\sqrt[17]{19}$$



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**15.** Write the surds in radical form:

$$5^{\frac{1}{7}}$$



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**16.** Write the surds in radical form:

$$17^{\frac{1}{6}}$$



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**17.** Write the surds in radical form:

$$5^{\frac{2}{3}}$$



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**18.** Write the surds in radical form:

$$142^{\frac{1}{2}}$$



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Try These

**1.** Find the decimal values of the following:

$$\frac{1}{2}$$



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2. Find the decimal values of the following:

$$\frac{1}{2^2}$$



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3. Find the decimal values of the following:

$$\frac{1}{5}$$



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4. Find the decimal values of the following:

$$\frac{1}{5 \times 2}$$



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5. Find the decimal values of the following:

$$\frac{3}{10}$$



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6. Find the decimal values of the following:

$$\frac{27}{25}$$



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7. Find the decimal values of the following:

$$\frac{1}{3}$$



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8. Find the decimal values of the following:

$$\frac{7}{6}$$



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9. Find the decimal values of the following:

$$\frac{5}{12}$$



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10. Locate  $\sqrt{5}$  and  $-\sqrt{5}$  on number line.



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**Think Discuss And Write**

1. Kurthi said  $\sqrt{2}$  can be written  $\frac{\sqrt{2}}{1}$  which is in  $\frac{p}{q}$  form. So  $\sqrt{2}$  is a rational number. Do you agree with her argument?



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## Exercise 1 1

1. (a) Write any three rational numbers



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2. (b) Explain rational number in your own words.



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3. Give one example each to the following statements.

i. A number which is rational but not an integer



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4. Give one example each to the following statements.

ii. A whole number which is not a natural number



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5. Give one example each to the following statements.

iii. An integer which is not a whole number



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6. Give one example each to the following statements.

iv. A number which is natural number, whole number, integer and rational number.



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7. Give one example each to the following statements.

v. A number which is an integer but not a natural number.





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8. Find five rational numbers between 1 and 2 .



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9. Insert three rational numbers between

$$\frac{3}{5} \text{ and } \frac{2}{3}$$



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10. Represent  $\frac{8}{5}$  and  $\frac{-8}{5}$  on the number line



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11. Express the following rational numbers in decimal form.

$$\frac{242}{1000}$$



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**12.** Express the following rational numbers in decimal form.

$$\frac{354}{500}$$



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**13.** Express the following rational numbers in decimal form.

$$\frac{2}{5}$$



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14. Express the following rational numbers in decimal form.

$$\frac{115}{4}$$



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15. Express the following rational numbers in decimal form.

$$\frac{2}{3}$$



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**16.** Express the following rational numbers in decimal form.

$$-\frac{25}{36}$$



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**17.** Express the following rational numbers in decimal form.

$$\frac{22}{7}$$



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**18.** Express the following rational numbers in decimal form.

$$\frac{11}{9}$$



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**19.** Express each of the following decimals in  $\frac{p}{q}$  form where  $q \neq 0$  and  $p, q$  are integers

0.36



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20. Express each of the following decimals in

$\frac{p}{q}$  form where  $q \neq 0$  and  $p, q$  are integers

15.4



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21. Express each of the following decimals in

$\frac{p}{q}$  form where  $q \neq 0$  and  $p, q$  are integers

10.25



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22. Express each of the following decimals in

$\frac{p}{q}$  form where  $q \neq 0$  and  $p, q$  are integers

3.25



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23. Express each of the following decimal

numbers in  $\frac{p}{q}$  form

$0.\bar{5}$



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24. Express each of the following decimal numbers in  $\frac{p}{q}$  form

$$3.\bar{8}$$



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25. Express each of the following decimal numbers in  $\frac{p}{q}$  form

$$0.\overline{36}$$



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26. Express each of the following decimal numbers in  $\frac{p}{q}$  form

3.1277



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27. Without actually dividing find which of the following are terminating decimals.

$$\frac{3}{25}$$



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**28.** Without actually dividing find which of the following are terminating decimals.

$$\frac{11}{18}$$



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**29.** Without actually dividing find which of the following are terminating decimals.

$$\frac{13}{20}$$



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30. Without actually dividing find which of the following are terminating decimals.

$$\frac{41}{42}$$



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## Exercise 1 2

1. Classify the following numbers as rational or irrational.

$$\sqrt{27}$$



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2. Classify the following numbers as rational or irrational.

$$\sqrt{441}$$



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3. Classify the following numbers as rational or irrational.

30.2323342345...



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4. Classify the following numbers as rational or irrational.

7.484848...



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5. Classify the following numbers as rational or irrational.

11.21132435465



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6. Classify the following numbers as rational or irrational.

0.3030030003...



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7. Give four examples for rational and irrational numbers?



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8. Find an irrational number between  $\frac{5}{7}$  and  $\frac{7}{9}$ . How many more there may be?



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9. Find two irrational numbers between 0.7 and 0.77



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10. Find the value of  $\sqrt{5}$  upto 3 decimal places.



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11. Find the value of  $\sqrt{7}$  up to six decimal places by long division method.



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12. Locate  $\sqrt{10}$  on the number line.



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**13.** Find at least two irrational numbers between 2 and 3.



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**14.** State whether the following statements are true or false. Justify your answers.

(i) Every irrational number is a real number.



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**15.** State whether the following statements are true or false. Justify your answers.

(ii) Every rational number is a real number.



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**16.** State whether the following statements are true or false. Justify your answers.

(iii) Every real number need not be a rational number



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**17.** State whether the following statements are true or false. Justify your answers.

(iv)  $n$  is not irrational if  $n$  is a perfect square.



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**18.** State whether the following statements are true or false. Justify your answers.

(v)  $\sqrt{n}$  is irrational if  $n$  is not a perfect square.



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**19.** State whether the following statements are true or false. Justify your answers.

(vi) All real numbers are irrational.



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### Exercise 13

**1.** Visualise 2.874 on the number line, using successive magnification.



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2. Visualilse  $5.\overline{28}$  on the number line, upto 3 decimal places.



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## Exercise 1 4

1. Simplify the following expressions.

$$(5 + \sqrt{7})(2 + \sqrt{5})$$



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2. Simplify the following expressions.

$$(5 + \sqrt{5})(5 - \sqrt{3})$$



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3. Simplify the following expressions.

$$(\sqrt{3} + \sqrt{7})^2$$



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4. Simplify the following expressions.

$$(\sqrt{11} + \sqrt{7})(\sqrt{11} + \sqrt{7})$$



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5. Classify the following numbers as rational or irrational.

$$5 - \sqrt{3}$$



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6. Classify the following numbers as rational or irrational.

$$\sqrt{3} + \sqrt{2}$$



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7. Classify the following numbers as rational or irrational.

$$(\sqrt{2} - 2)^2$$



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8. Classify the following numbers as rational or irrational.

$$\frac{2\sqrt{7}}{7\sqrt{7}}$$



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9. Classify the following numbers as rational or irrational.

$$2\pi$$



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**10.** Classify the following numbers as rational or irrational.

$$\frac{1}{\sqrt{3}}$$



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**11.** Classify the following numbers as rational or irrational.

$$(2 + \sqrt{2})(2 - \sqrt{2})$$



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**12.** In the following equations, find whether variables  $x$ ,  $y$ ,  $z$  etc. represent rational or irrational numbers

$$x^2 = 7$$



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**13.** In the following equations, find whether variables  $x$ ,  $y$ ,  $z$  etc. represent rational or irrational numbers

$$y^2 = 16$$





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**14.** In the following equations, find whether variables  $x$ ,  $y$ ,  $z$  etc. represent rational or irrational numbers

$$z^2 = 0.02$$



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**15.** In the following equations, find whether variables  $x$ ,  $y$ ,  $z$  etc. represent rational or

irrational numbers

$$y^2 = \frac{17}{4}$$



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**16.** In the following equations, find whether variables  $x$ ,  $y$ ,  $z$  etc. represent rational or irrational numbers

$$w^2 = 27$$



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**17.** In the following equations, find whether variables  $x$ ,  $y$ ,  $z$  etc. represent rational or irrational numbers

$$t^4 = 256$$



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**18.** Every surd is an irrational, but every irrational need not be a surd. Justify your answer.



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**19.** Rationalise the denominators of the following:

$$\frac{1}{3 + \sqrt{2}}$$



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**20.** Rationalise the denominators of the following:

$$\frac{1}{\sqrt{7} - \sqrt{6}}$$



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21. Rationalise the denominators of the following:

$$\frac{1}{\sqrt{7}}$$



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22. Rationalise the denominators of the following:

$$\frac{\sqrt{6}}{\sqrt{3} - \sqrt{2}}$$



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23. Simplify each of the following by rationalising the denominator:

$$\frac{6 - 4\sqrt{2}}{6 + 4\sqrt{2}}$$



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24. Simplify each of the following by rationalising the denominator:

$$\frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}}$$



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25. Simplify each of the following by rationalising the denominator:

$$\frac{1}{3\sqrt{2} - 2\sqrt{3}}$$



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26. Simplify each of the following by rationalising the denominator:

$$\frac{3\sqrt{5} - \sqrt{7}}{3\sqrt{3} + \sqrt{2}}$$



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27. Find the value of  $\frac{\sqrt{10} - \sqrt{5}}{2\sqrt{2}}$  upto three decimal places. (take  $\sqrt{2} = 1.414$  and  $\sqrt{5} = 2.236$ )



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28. Find:

$$64^{\frac{1}{6}}$$



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**29. Find:**

$$32^{\frac{1}{5}}$$



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**30. Find:**

$$625^{\frac{1}{4}}$$



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**31. Find:**

$$16^{\frac{3}{2}}$$



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**32. Find:**

$$243^{\frac{2}{5}}$$



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**33. Find:**

$$(46656)^{\frac{-1}{6}}$$



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**34. Simplify :**  $\sqrt[4]{81} - 8\sqrt[3]{343} + 15\sqrt[5]{32} + \sqrt{225}$



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**35. If 'a' and 'b' are rational numbers, find the value of a and b in each of the following**

equations.

$$\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} = a + b\sqrt{6}$$



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**36.** If 'a' and 'b' are rational numbers, find the value of a and b in each of the following equations.

$$\frac{\sqrt{5} + \sqrt{3}}{2\sqrt{5} - 3\sqrt{3}} = a - b\sqrt{15}$$



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37. Find the square root of  $11 + 2\sqrt{30}$



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